

LIST OF CLAIMS / AMENDMENTS

Claims pending: Claims 1, 3-39, and 41-57

Canceled or Withdrawn claims: Claims 2, and 40

Amended claims: Claims 1, 20, 21-28, 37-39, 46-47, 49, and 54

Previously Presented: Claim 45

New claims: None.

1. **(Currently Amended)** A method performed by a control client that communicates with a load-balancing cluster of server nodes configured to service application-layer requests sent by user clients to a virtual address common to the cluster, the method comprising:

dynamically determining, by the control client, which server nodes are members of the ~~present members of~~ a load-balancing cluster; which includes nodes and a node manager; and

monitoring application-layer availability of one or more members of the server nodes in the load-balancing cluster, the monitoring being performed by one or more clients the control client generating and sending, from outside of the load-balancing cluster application-layer, requests to those server nodes determined to be members of the load-balancing cluster; and

in accordance with the application-layer availability of a server node in the load-balancing cluster as determined by the application-layer monitoring of the control client, sending to the load-balancing cluster a message that is configured to control whether the server node handles application-layer requests sent to the load-

1 balancing cluster by the user clients, where the application-layer requests sent by
2 the control client to monitor application-layer availability conform to a same
3 application-layer protocol that the user client requests conform to.

4
5 **2. (Canceled)**

6
7 **3. (Original)** A method as recited in claim 1 further comprising
8 exocusterly and selectively deactivating one or more active members of the
9 cluster.

10
11 **4. (Original)** A method as recited in claim 1 further comprising,
12 based upon the monitoring, identifying one or more active members of the cluster
13 that are presently overwhelmed at the application-layer.

14
15 **5. (Original)** A method as recited in claim 1 further comprising:
16 based upon the monitoring, identifying one or more active members of the
17 cluster that are presently overwhelmed at the application-layer;
18 exocusterly deactivating one or more members identified by the
19 identifying.

20
21 **6. (Original)** A method as recited in claim 1 further comprising
22 exocusterly and selectively activating one or more inactive members of the
23 cluster.
24
25

1 7. **(Original)** A method as recited in claim 1 further comprising,
2 based upon the monitoring, identifying one or more inactive members of the
3 cluster that are not presently overwhelmed at the application-layer.

4
5 8. **(Original)** A method as recited in claim 1 further comprising:
6 based upon the monitoring, identifying one or more inactive members of
7 the cluster that are not presently overwhelmed at the application-layer;
8 exocusterly activating one or more members identified by the identifying.

9
10 9. **(Original)** A method as recited in claim 1 further comprising:
11 based upon the monitoring, identifying one or more active members of the
12 cluster that are presently overwhelmed at the application-layer and identifying one
13 or more inactive members of the cluster that are not presently overwhelmed at the
14 application-layer;
15 exocusterly deactivating one or more active members identified by the
16 identifying;
17 exocusterly activating one or more inactive members identified by the
18 identifying.

19
20 10. **(Original)** A method as recited in claim 1 further comprising
21 determining a present activity state of members of the cluster.

22
23 11. **(Original)** A method as recited in claim 1 further comprising:
24 determining a present activity state of members of the cluster;
25

1 tracking and persisting the activity states of the members of the cluster.

2
3 **12. (Original)** A method as recited in claim 11, wherein the activity
4 states include cluster states.

5
6 **13. (Original)** A method as recited in claim 11 further comprising
7 reporting a present activity state of one or more members of the cluster.

8
9 **14. (Original)** A method as recited in claim 11 further comprising
10 reporting historical record of the activity states of one or more members of the
11 cluster.

12
13 **15. (Original)** A method as recited in claim 11 further comprising
14 reporting a present application-layer state of one or more members of the cluster.

15
16 **16. (Original)** A method as recited in claim 11 further comprising
17 reporting historical record of the application-layer states of one or more members
18 of the cluster.

19
20 **17. (Original)** A method as recited in claim 1, wherein the
21 monitoring comprises monitoring in one or more different application-layer
22 protocols.

1 **18. (Original)** A method as recited in claim 1, further comprises,
2 based upon the monitoring, determining the application-layer availability of one or
3 more members based upon an indicator of such availability, the indicator sent
4 from a member being monitored.

5
6 **19. (Original)** A method as recited in claim 1, further comprises:
7 based upon the monitoring, determining the application-layer availability of
8 one or more members based upon a indicator of such availability, the indicator
9 sent from a member being monitored;
10 the member being monitored determining such availability and generating
11 such indicator.

12
13 **20. (Currently Amended)** A tangible computer-readable medium
14 having computer-executable instructions that, when executed by a computer,
15 perform the method as recited in claim 1.

16
17 **21. (Currently Amended)** A method performed by a control client
18 that communicates with a load-balancing cluster of server nodes configured to
19 service application-layer requests sent by user clients to a virtual address common
20 to the cluster, the method comprising:

21 monitoring application-layer availability of the server nodes in the
22 ~~members of a load-balancing cluster which includes nodes and a node manager,~~
23 the monitoring being performed by ~~one or more clients~~ the control client
24 generating and sending, from outside of the load-balancing cluster application-
25

1 layer, requests to those server nodes determined to be members of the load-
2 balancing cluster; and

3 ~~exocusterly controlling activity state of the members of the cluster.~~

4 in accordance with the application-layer availability of a server node in the
5 load-balancing cluster as determined by the application-layer monitoring of the
6 control client, sending to the load-balancing cluster a message that is configured to
7 control whether the server node handles application-layer requests sent to the load-
8 balancing cluster by the user clients, where the application-layer requests sent by
9 the control client to monitor application-layer availability conform to a same
10 application-layer protocol that the user client requests conform to.

11
12 **22. (Currently Amended)** A method as recited in claim 21, wherein
13 the ~~controlling~~ monitoring comprises selectively deactivating one or more active
14 members of the cluster.

15
16 **23. (Currently Amended)** A method as recited in claim 21, wherein
17 the ~~controlling~~ monitoring comprises, based upon the monitoring, identifying one
18 or more active members of the cluster that are presently overwhelmed at the
19 application-layer.

20
21 **24. (Currently Amended)** A method as recited in claim 21, wherein
22 the ~~controlling~~ monitoring comprises:

23 based upon the monitoring, identifying one or more active members of the
24 cluster that are presently overwhelmed at the application-layer;

1 exocusterly deactivating one or more members identified by the
2 identifying.

3
4 **25. (Currently Amended)** A method as recited in claim 21, wherein
5 the ~~controlling~~ monitoring comprises selectively activating one or more inactive
6 members of the load-balancing cluster.

7
8 **26. (Currently Amended)** A method as recited in claim 21, wherein
9 the ~~controlling~~ monitoring comprises, based upon the monitoring, identifying one
10 or more inactive members of the cluster that are not presently overwhelmed at the
11 application-layer.

12
13 **27. (Currently Amended)** A method as recited in claim 21, wherein
14 the ~~controlling~~ monitoring comprises:

15 based upon the monitoring, identifying one or more inactive members of
16 the cluster that are not presently overwhelmed at the application-layer;

17 exocusterly activating one or more members identified by the identifying.

18
19 **28. (Currently Amended)** A method as recited in claim 21, wherein
20 the ~~controlling~~ monitoring comprises:

21 based upon the monitoring, identifying one or more active members of the
22 cluster that are presently overwhelmed at the application-layer and identifying one
23 or more inactive members of the cluster that are not presently overwhelmed at the
24 application-layer;

1 exocusterly deactivating one or more active members identified by the
2 identifying;

3 exocusterly activating one or more inactive members identified by the
4 identifying.

5
6 **29. (Original)** A method as recited in claim 21 further comprising
7 determining a present activity state of the members of the cluster.

8
9 **30. (Original)** A method as recited in claim 21 further comprising:
10 determining a present activity state of the members of the cluster;
11 tracking and persisting the activity states of the members of the cluster.

12
13 **31. (Original)** A method as recited in claim 30, wherein the activity
14 state includes a cluster state.

15
16 **32. (Original)** A method as recited in claim 30 further comprising
17 reporting a present activity state of one or more members of the cluster.

18
19 **33. (Original)** A method as recited in claim 30 further comprising
20 reporting historical record of the activity states of one or more members of the
21 cluster.

22
23 **34. (Original)** A method as recited in claim 30 further comprising
24 reporting a present application-layer state of one or more members of the cluster.
25

1
2 **35. (Original)** A method as recited in claim 30 further comprising
3 reporting historical record of the application-layer states of one or more members
4 of the cluster.

5
6 **36. (Original)** A method as recited in claim 21, wherein the
7 monitoring comprises monitoring in one or more different application-layer
8 protocols.

9
10 **37. (Currently Amended)** A tangible computer-readable medium
11 having computer-executable instructions that, when executed by a computer,
12 performs the method as recited in claim 21.

13
14 **38. (Currently Amended)** A tangible computer-readable medium
15 having computer-executable instructions that, when executed by a computer,
16 perform a method performed by a control client that communicates with a load-
17 balancing cluster of server nodes configured to service application-layer requests
18 sent by user clients to a virtual address common to the cluster, the method
19 comprising:

20 dynamically determining, by the control client, which server nodes are
21 members of the ~~present members of~~ a load-balancing cluster; ~~which includes~~
22 ~~nodes and a node manager and an activity state of each member;~~

23 monitoring application-layer availability ~~of the one or more members of the~~
24 server nodes in the load-balancing cluster, the monitoring being performed by the
25

1 control client generating and sending, from outside of the load-balancing cluster
2 application-layer, requests to those server nodes determined to be members of the
3 load-balancing cluster; and

4 ~~as such availability is observed by the computer outside of the cluster which is~~
5 ~~communicatively linked to the node manager in the cluster, such that the~~
6 ~~monitoring is from a client perspective to detect an error that may impact the~~
7 ~~application-layer availability as it appears to the computer from outside of the~~
8 ~~cluster; and~~

9 ~~exocusterly controlling the activity state of the members of the cluster.~~

10 in accordance with the application-layer availability of a server node
11 in the load-balancing cluster as determined by the application-layer monitoring of
12 the control client, sending to the load-balancing cluster a message that is
13 configured to control whether the server node handles application-layer requests
14 sent to the load-balancing cluster by the user clients, where the application-layer
15 requests sent by the control client to monitor application-layer availability
16 conform to a same application-layer protocol that the user client requests conform
17 to.

18
19 **39. (Currently Amended)** A system comprising:

20 a control client that communicates with a load-balancing cluster of server
21 nodes configured to service application-layer requests sent by user clients to a
22 virtual address common to the cluster;

23 a dynamic cluster-membership determiner configured to exocusterly and
24 dynamically determine, by the control client, which server nodes are members of
25

1 ~~the present members of a load-balancing cluster; which includes nodes and a node~~
2 ~~manager; and~~

3 an exocluster monitor configured to monitor application-layer availability
4 ~~of the present members of the server nodes in the load-balancing cluster, the~~
5 ~~monitoring being performed by the control client generating and sending, from~~
6 ~~outside of the load-balancing cluster application-layer, requests to those server~~
7 ~~nodes determined to be members of the load-balancing cluster; and~~
8 ~~the exocluster monitor distributed across one or more clients outside of the cluster~~
9 ~~which are communicatively linked to the node manager in the cluster, such that~~
10 ~~monitoring is from a client perspective to detect an error that may impact the~~
11 ~~application-layer availability as it appears to the one or more clients from outside~~
12 ~~of the cluster.~~

13 in accordance with the application-layer availability of a server node in the
14 load-balancing cluster as determined by the application-layer monitoring of the
15 control client, sending to the load-balancing cluster a message that is configured to
16 control whether the server node handles application-layer requests sent to the load-
17 balancing cluster by the user clients, where the application-layer requests sent by
18 the control client to monitor application-layer availability conform to a same
19 application-layer protocol that the user client requests conform to.

20
21 **40. (Cancelled)**

22
23 **41. (Original)** A system as recited in claim 39 further comprising an
24 overload-identifier configured to identify, based upon the monitored availability,
25

1 one or more active members of the cluster that are presently overwhelmed at the
2 application-layer.

3
4 **42. (Original)** A system as recited in claim 39 further comprising an
5 overload-identifier configured to identify, based upon the monitored availability,
6 one or more inactive members of the cluster that are not presently overwhelmed at
7 the application-layer.

8
9 **43. (Original)** A system as recited in claim 39 further comprising a
10 state-determiner configured to determine a present activity state of members of the
11 cluster.

12
13 **44. (Original)** A system as recited in claim 39 further comprising:
14 a state-determiner configured to determine a present activity state of
15 members of the cluster;
16 a database configured to store the activity states of the members of the
17 cluster.

18
19 **45. (Previously Presented)** A system as recited in claim 39, wherein
20 the exocluster monitor is protocol agnostic.
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1 **46. (Currently Amended)** A system comprising:

2 a control client that communicates with a load-balancing cluster of server
3 nodes configured to service application-layer requests sent by user clients to a
4 virtual address common to the cluster;

5 an exocluster monitor configured to monitor application-layer availability
6 of ~~members of a~~ the server nodes in the load-balancing cluster which includes
7 ~~nodes and a node manager,~~ the monitoring being performed by the control client
8 generating and sending, from outside of the load-balancing cluster application-
9 layer, requests to those server nodes determined to be members of the load-
10 balancing cluster; and

11 ~~the exocluster monitor distributed across one or more clients outside of the cluster~~
12 ~~which are communicatively linked to the node manager in the cluster, such that~~
13 ~~monitoring is from a client perspective to detect an error that may impact the~~
14 ~~application-layer availability as it appears to the one or more clients from outside~~
15 ~~of the cluster; and~~

16 in accordance with the application-layer availability of a server node in the
17 load-balancing cluster as determined by the application-layer monitoring of the
18 control client, sending to the load-balancing cluster a message that is configured to
19 control whether the server node handles application-layer requests sent to the load-
20 balancing cluster by the user clients, where the application-layer requests sent by
21 the control client to monitor application-layer availability conform to a same
22 application-layer protocol that the user client requests conform to.

23 ~~an exocluster controller configured to control an activity state of members~~
24 ~~of the cluster.~~

1
2 **47. (Currently Amended)** A system as recited in claim 46, wherein
3 the exocluster ~~controller~~ monitor is further configured to exocusterly and
4 selectively deactivate one or more active members of the cluster.

5
6 **48. (Original)** A system as recited in claim 46 further comprising an
7 overload-identifier configured to identify, based upon the monitored availability,
8 one or more active members of the cluster that are presently overwhelmed at the
9 application-layer.

10
11 **49. (Currently Amended)** A system as recited in claim 46, wherein
12 the exocluster ~~controller~~ monitor is further configured to exocusterly and
13 selectively activate one or more inactive members of the cluster.

14
15 **50. (Original)** A system as recited in claim 46 further comprising an
16 overload-identifier configured to identify, based upon the monitored availability,
17 one or more inactive members of the cluster that are not presently overwhelmed at
18 the application-layer.

19
20 **51. (Original)** A system as recited in claim 46 further comprising a
21 state-determiner configured to determine a present activity state of the members of
22 the cluster.

1 **52. (Original)** A system as recited in claim 46 further comprising:
2 a state-determiner configured to determine a present activity state of the
3 members of the cluster;

4 a database configured to store the activity states of the members of the
5 cluster.

6
7 **53. (Original)** A system as recited in claim 46, wherein the monitor is
8 protocol agnostic.

9
10 **54. (Currently Amended)** A dynamic, active, exocuster monitoring
11 system for monitoring application-layer availability of members of server nodes in
12 a load-balancing cluster and for controlling an activity state of such members
13 server nodes, the monitoring system comprising:

14 a control client that communicates with a load-balancing cluster of server
15 nodes configured to service application-layer requests sent by user clients to a
16 virtual address common to the cluster;

17 an app-monitor configured to exocusterly monitor application-layer
18 availability of the server nodes in the load-balancing cluster, the monitoring being
19 performed by the control client generating and sending, from outside of the load-
20 balancing cluster application-layer, requests to those server nodes determined to
21 be members of the load-balancing cluster; and ~~the members of the cluster which~~
22 ~~includes nodes and a node manager, the app-monitor distributed across one or~~
23 ~~more clients outside of the cluster which are communicatively linked to the node~~
24 ~~manager in the cluster, such that monitoring is from a client perspective to detect~~
25

1 an error that may impact the application-layer availability as it appears to the one
2 or more clients from outside of the cluster;

3 in accordance with the application-layer availability of a server node in the
4 load-balancing cluster as determined by the application-layer monitoring of the
5 control client, sending to the load-balancing cluster a message that is configured to
6 control whether the server node handles application-layer requests sent to the load-
7 balancing cluster by the user clients, where the application-layer requests sent by
8 the control client to monitor application-layer availability conform to a same
9 application-layer protocol that the user client requests conform to.

10 ~~a cluster-control configured to exocusterly determine the activity state of~~
11 ~~the members of the cluster and to exocusterly control the activity state of the~~
12 ~~members of the cluster; and~~

13 ~~a central-controller configured to coordinate and control the app-monitor~~
14 ~~and the cluster-control.~~

15
16 **55. (Original)** A system as recited in claim 54 further comprising a
17 database configured to store state change information, including cluster state and
18 application-layer state.

19
20 **56. (Original)** A system as recited in claim 54 further comprising
21 multiple app-monitors.

22
23 **57. (Original)** A system as recited in claim 54 further comprising
24 multiple cluster-controls.